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10/646,527	08/22/2003	Kenneth S. Collins	6915 P07	8502

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Patent Counsel, M/S 2061
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EXAMINER

ARANCIBIA, MAUREEN GRAMAGLIA

ART UNIT	PAPER NUMBER
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1763

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	04/05/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary

Application No.

10/646,527

Applicant(s)

COLLINS ET AL.

Examiner

Maureen G. Arancibia

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 16 January 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-13, 15-23, 26 and 27 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-13, 15-23, 26 and 27 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>10/06</u> | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 16 January 2007 has been entered.

Claim Objections

2. Claims 15, 26, and 27 are objected to because of the following informalities: The square brackets should be deleted from Claim 15. Line 8 of each of Claims 26 and 27 should be corrected to recite "a **second** reentrant path." Appropriate correction is required.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. **Claims 26 and 27 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.**

Specifically, it is unclear how the second hollow conduit recited in Claims 26 and 27 could provide a second reentrant path, when no second RF plasma source power applicator is recited to be coupled to the second conduit. Therefore, it appears that

Claims 26 and 27 should be amended to recite this second RF plasma source power applicator coupled to the second conduit.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

7. **Claims 1-4, 6-13, 17, 18, and 22-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 6,321,134 to Henley et al. (from Applicant's IDS) in view of U.S. Patent 6,432,260 to Mahoney et al., U.S. Patent 6,150,628 to Smith et al. (from Applicant's IDS), and U.S. Patent 5,074,456 to Degner et al. (from Applicant's IDS).**

In regards to Claims 1, 22, and 23, Henley et al. teaches a system for processing a workpiece, comprising: (A) a plasma immersion ion implantation (PIII) reactor (Figure

4), comprising: an enclosure 422 comprising a side wall and a ceiling and defining a chamber 414; a workpiece support pedestal 465 within the chamber having a workpiece support surface facing said ceiling and defining a process region extending generally across said wafer support pedestal; an inductively coupled source power applicator 440; and an RF plasma source power generator 466 coupled to said inductively coupled source power applicator for inductively coupling RF source power into said process zone; (B) a second wafer processing apparatus (Column 4, Lines 18-40; Column 6, Lines 18-27); and (C) a wafer transfer apparatus 20 for transferring said workpiece between said plasma immersion ion implantation reactor and said second wafer processing apparatus. (Figures 1 and 3)

In regards to Claims 1, 13, and 22, Henley et al. does not teach a gas distribution apparatus or a hollow conduit outside of the chamber having first and second ends connected to respective openings in the chamber at opposite sides of the process region, so as to provide a first reentrant path, or that the plasma comprises a plasma current in said reentrant path that oscillates at an RF frequency of the RF plasma source power applicator.

Mahoney et al. teaches a plasma reactor (Figure 1), comprising: an enclosure 2 comprising a side wall and a ceiling and defining a chamber (Figure 1); a workpiece support pedestal 17 within the chamber having a workpiece support surface facing said ceiling and defining a process region extending generally across said wafer support pedestal and confined laterally by said side wall and axially between said workpiece support pedestal and said ceiling; said enclosure having a first pair of openings at

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generally opposite sides of said process region (Figure 1); a first hollow conductive (Column 6, Lines 15-16) conduit 1 outside of said chamber having first and second ends connected to respective ones of said first pair of openings, so as to provide a first reentrant path extending through said conduit and across at least nearly the entire diameter of said process region, *as broadly recited in the claims*; a gas distribution apparatus 16 on a side wall of the reactor connected to gas supply 15 for introducing a process gas; a first RF plasma source power applicator 10 for generating a plasma in the chamber; and a capacitive electrode 30 provided across the ceiling. The plasma comprises a plasma current 13 in said reentrant path that oscillates at an RF frequency of said first RF plasma source power applicator. (Column 6, Lines 31-36)

It would have been obvious to one of ordinary skill in the art to modify the reactor taught by Henley et al. to include the gas distribution apparatus taught by Mahoney et al., and to replace the inductive plasma generating means taught by Henley et al. with the hollow conductive conduit, power applicator, reentrant path, and capacitive electrode taught by Mahoney et al. The motivation for providing a gas distribution apparatus, as taught by Mahoney et al. (Column 6, Lines 40-46), would have been to supply working gases to the reactor to be excited by the plasma discharge. The motivation for providing the hollow conduit, power applicator, and reentrant path, as taught by Mahoney et al. (Column 3, Line 1 - Column 4, Line 14), would have been to have an inductively coupled plasma with a high coupling coefficient without making use of dielectric vacuum wall materials, with their undesirable thermal mechanical characteristics. The motivation for providing the capacitive electrode, as taught by

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Mahoney et al. (Column 7, Lines 1-17), would have been to use it to ignite the plasma discharge.

The combination of Henley et al. and Mahoney et al. does not expressly teach an annular insulating gap in the first hollow conduit separating the hollow conduit into axial sections.

Smith et al. teaches an annular insulating gap 116 in a metallic hollow conduit 100 separating the hollow conduit into axial sections. (Figure 3)

It would have been obvious to one of ordinary skill in the art to modify the hollow conduit taught by the combination of Henley et al. and Mahoney et al. to comprise an annular insulating gap, as taught by Smith et al. The motivation for making such a modification, as taught by Smith et al. (Column 8, Lines 3-27), would have been to prevent induced current flow from forming in the wall of the hollow conduit (*the plasma chamber itself*).

The combination of Henley et al., Mahoney et al., and Smith et al. does not expressly teach that the gas distribution apparatus comprises a plurality of gas distribution openings provided across the ceiling of the chamber and encircled by the reentrant path.

Degner et al. teaches that a ceiling electrode assembly 10 can comprise a plurality of gas distribution openings 16 (Figures 3 and 4; Column 7, Lines 13-20).

It would have been obvious to one of ordinary skill in the art to modify the apparatus taught by the combination of Henley et al., Mahoney et al., and Smith et al. to provide a plurality of gas distribution openings in the ceiling capacitive electrode, as

taught by Degner et al. The motivation for doing so, as taught by Degner et al. (Column 1, Lines 21-48), would have been to provide gas flowing downward between the electrode and the substrate, so as to allow a uniform plasma to be generated and uniform processing of the substrate.

The gas supply coupled to the gas distribution apparatus as taught by the combination of Henley et al., Mahoney et al., Smith et al., and Degner et al. would be inherently structurally capable of introducing process gas containing a first species to be ion implanted into a layer of the workpiece. Also, the plasma reactor taught by the combination of Henley et al., Mahoney et al., Smith et al., and Degner et al. would still be structurally capable of performing plasma immersion ion implantation, based on the process settings. It has been held that claims directed to apparatus must be distinguished from the prior art in terms of structure rather than function. *In re Danly*, 263 F.2d 844, 847, 120 USPQ 528, 531 (CCPA 1959). Also, a claim containing a "recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus" if the prior art apparatus teaches all the structural limitations of the claim. *Ex parte Masham*, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987)

In regards to Claim 2, Henley et al. teaches a cleaning species source plasma reactor 24 (Column 11, Line 60 - Column 12, Line 7), which would inherently comprise a source of cleaning species precursor gases in order to be able to generate a plasma. Henley et al. also teaches a passage (*wafer transfer chamber*, Figure 3) coupling said cleaning plasma reactor to the plasma immersion ion implantation reactor.

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In regards to Claims 3 and 4, the particular type of gas used is a process limitation rather than an apparatus limitation, and the recitation of a particular type of gas does not limit an apparatus claim, see *In re Casey*, 152 USPQ 235; *In re Rishoi*, 94 USPQ 71; *In re Young*, 25 USPQ 69; *In re Dulberg*, 129 USPQ 348; *Ex parte Thibault*, 64 USPQ 666; and *Ex parte Masham*, 2 USPQ2d 1647. This rejection is based on the fact the apparatus structure taught by Henley et al. has the inherent structural capability of being used in the manner intended by the Applicant. It has been held that claims directed to apparatus must be distinguished from the prior art in terms of structure rather than function. *In re Dally*, 263 F.2d 844, 847, 120 USPQ 528, 531 (CCPA 1959). Also, a claim containing a "recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus" if the prior art apparatus teaches all the structural limitations of the claim. *Ex parte Masham*, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987)

In regards to Claim 6, Henley et al. teaches that the processing system can comprise an ion beam implantation apparatus (Column 14, Lines 25-26).

While Henley et al. does not expressly teach that the processing system can include both the PIII apparatus and an ion beam implantation apparatus, it would have been obvious to one of ordinary skill in the art to include both of these apparatuses in the system. The motivation for doing so would have been to perform further processing on the workpiece.

Such a system would be inherently structurally capable of implanting a second species into a layer of the workpiece. This rejection is based on the fact the

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apparatus structure taught above has the inherent structural capability of being used in the manner intended by the Applicant. It has been held that claims directed to apparatus must be distinguished from the prior art in terms of structure rather than function. *In re Danly*, 263 F.2d 844, 847, 120 USPQ 528, 531 (CCPA 1959). Also, a claim containing a "recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus" if the prior art apparatus teaches all the structural limitations of the claim. *Ex parte Masham*, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987)

In regards to Claim 7, the inclusion of material or article worked upon by a structure being claimed does not impart patentability to the claims. *In re Young*, 75 F.2d 966, 25 USPQ 69 (CCPA 1935) (as restated in *In re Otto*, 312 F.2d 937, 136 USPQ 458, 459 (CCPA 1963)). Also, the particular types of species to be implanted are process limitations rather than apparatus limitations, and the recitation of which does not limit an apparatus claim, see *In re Casey*, 152 USPQ 235; *In re Rishoi*, 94 USPQ 71; *In re Young*, 25 USPQ 69; *In re Dulberg*, 129 USPQ 348; *Ex parte Thibault*, 64 USPQ 666; and *Ex parte Masham*, 2 USPQ2d 1647. This rejection is based on the fact the apparatus structure taught by Henley et al., Mahoney et al., Smith et al., and Degner et al. has the inherent structural capability of being used in the manner intended by the Applicant. It has been held that claims directed to apparatus must be distinguished from the prior art in terms of structure rather than function. *In re Danly*, 263 F.2d 844, 847, 120 USPQ 528, 531 (CCPA 1959). Also, a claim containing a "recitation with respect to the manner in which a claimed apparatus is intended to be employed does

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not differentiate the claimed apparatus from a prior art apparatus" if the prior art apparatus teaches all the structural limitations of the claim. *Ex parte Masham*, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987)

In regards to Claim 8, it has been held that the mere duplication of parts has no patentable significance unless a new and unexpected result is produced. *In re Harza*, 274 F.2d 669, 124 USPQ 378 (CCPA 1960). Moreover, a second PIII reactor would be capable of implanting any species into a layer of the workpiece. This rejection is based on the fact the apparatus structure taught by Henley et al., Mahoney et al., Smith et al., and Degner et al. has the inherent structural capability of being used in the manner intended by the Applicant. It has been held that claims directed to apparatus must be distinguished from the prior art in terms of structure rather than function. *In re Danly*, 263 F.2d 844, 847, 120 USPQ 528, 531 (CCPA 1959). Also, a claim containing a "recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus" if the prior art apparatus teaches all the structural limitations of the claim. *Ex parte Masham*, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987).

In regards to Claim 9, see the discussion of Claim 7.

In regards to Claim 10, Henley et al. teaches an anneal chamber 303. (Column 12, Lines 8-16)

In regards to Claim 11, the plasma etching chamber 301 taught by Henley et al. (Column 12, Lines 45-51) would be capable of stripping a photoresist. This rejection is based on the fact the apparatus structure taught by Henley et al., Mahoney

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et al., Smith et al., and Degner et al. has the inherent structural capability of being used in the manner intended by the Applicant. It has been held that claims directed to apparatus must be distinguished from the prior art in terms of structure rather than function. *In re Danly*, 263 F.2d 844, 847, 120 USPQ 528, 531 (CCPA 1959). Also, a claim containing a "recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus" if the prior art apparatus teaches all the structural limitations of the claim. *Ex parte Masham*, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987)

In regards to Claim 12, Henley et al. teaches a wet clean chamber 305. (Column 17, Line 53 - Column 18, Line 12)

In regards to Claim 18, Henley et al. does not expressly teach a bias source coupled to the workpiece support.

Mahoney et al. teaches that an RF bias power generator can be coupled to the workpiece support. (Column 6, Lines 46-47)

It would have been obvious to one of ordinary skill in the art to modify the apparatus taught by the combination of Henley et al., Mahoney et al., Smith et al. and Degner et al. to include an RF bias power generator, as taught by Mahoney et al. The motivation for making such a modification, as taught by Mahoney et al. (Column 6, Lines 46-49), would have been that biasing is appropriate for conventional plasma processing.

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Further in regards to Claims 22 and 23, again, it has been held that the mere duplication of parts has no patentable significance unless a new and unexpected result is produced. *In re Harza*, 274 F.2d 669, 124 USPQ 378 (CCPA 1960).

8. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Henley et al. in view of Mahoney et al., Smith et al., and Degner et al. as applied to Claim 1 above, and further in view of U.S. Patent 6,643,557 to Miller et al.

The teachings of Henley et al., Mahoney et al., Smith et al., and Degner et al. were discussed above. Henley et al. additionally teaches a process controller 31.

The combination of Henley et al., Mahoney et al., Smith et al., and Degner et al. does not expressly teach an optical metrology chamber for obtaining a measurement of ion implantation in a workpiece, and coupled to the process controller.

Miller et al. teaches an optical metrology chamber 150 (Column 4, Lines 44-48) for obtaining a measurement of ion implantation in a workpiece (Column 8, Lines 34-37) and coupled to a process controller 130.

It would have been obvious to one of ordinary skill in the art to modify the combination of Henley et al., Mahoney et al., Smith et al., and Degner et al. to include an optical metrology chamber coupled to the process controller. The motivation for doing so, as taught by Miller et al. (Column 8, Lines 36-39), would have been to allow for adjustment of ion implantation dosage on subsequent ion implantation processes.

9. Claims 15-17 and 19-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Henley et al. in view of Mahoney et al., Smith et al., and Degner

et al. as applied to Claims 1 and 18 above, and further in view of U.S. Patent 5,571,366 to Ishii et al.

The teachings of Henley et al., Mahoney et al., Smith et al., and Degner et al. were discussed above.

In regards to Claims 15 and 16, the combination of Henley et al., Mahoney et al., Smith et al., and Degner et al. does not expressly teach the claimed features of the reactor.

Ishii et al. teaches that the gap between the ceiling of a chamber and a wafer support pedestal 4 can be adjustable by use of pedestal elevating mechanism 78. (Figure 14)

It would have been obvious to one of ordinary skill in the art to modify the reactor taught by the combination of Henley et al., Mahoney et al., Smith et al., and Degner et al. to have the gap between the ceiling of a chamber and a wafer support pedestal be adjustable, as taught by Ishii et al. The motivation for making such a modification, as taught by Ishii et al. (Column 11, Lines 61-67), would have been to allow the surface to be processed to be moved to a space having an optimum plasma density. Henley et al., Mahoney et al., Smith et al., Degner et al. et al., and Ishii et al., the ceiling would be inherently capable of comprising a constriction of the reentrant toroidal path in the process zone for enhancement of plasma ion density, and the gap between the ceiling and the pedestal would be inherently capable of being sufficiently small such that the reentrant path would be more constricted there than elsewhere along the reentrant path, simply by adjusting the gap to be smaller. This rejection is based on the fact the

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apparatus structure taught above has the inherent structural capability of being used in the manner intended by the Applicant. It has been held that claims directed to apparatus must be distinguished from the prior art in terms of structure rather than function. *In re Danly*, 263 F.2d 844, 847, 120 USPQ 528, 531 (CCPA 1959). Also, a claim containing a "recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus" if the prior art apparatus teaches all the structural limitations of the claim. *Ex parte Masham*, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987).

In regards to Claim 17, the combination of Henley et al., Mahoney et al., Smith et al., and Degner et al. does not expressly teach that the workpiece support pedestal can comprise an electrostatic chuck with a thermal control apparatus for workpiece thermal control.

Ishii et al. teaches that a workpiece support pedestal 4 comprises an electrostatic chuck 12 with a thermal control apparatus 9 for workpiece thermal control. (Figure 1)

It would have been obvious to one of ordinary skill in the art to modify the workpiece support pedestal taught by the combination of Henley et al., Mahoney et al., Smith et al., and Degner et al. to comprise an electrostatic chuck and a thermal control apparatus, as taught by Ishii et al. The motivation for including an electrostatic chuck, as taught by Ishii et al. (Column 5, Lines 39-42), would have been to allow the wafer to be held in place by a Coulomb force. The motivation for including a thermal control apparatus, as taught by Ishii et al. (Column 5, Lines 19-30), would have been to allow the target surface of the wafer to be processed to be cooled to a desired temperature.

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In regards to Claims 19-21, the combination of Henley et al., Mahoney et al., Smith et al., and Degner et al. as applied to Claim 18 teaches an RF bias coupled to the workpiece support, but does not expressly teach the RF bias power frequency.

Ishii et al. teaches an inductively coupled plasma apparatus (Figure 1), comprising an RF bias generator 19 having an RF bias frequency of about 2 MHz coupled to a workpiece support pedestal 4. (Column 5, Line 56 - Column 6, Line 16)

It would have been obvious to one of ordinary skill in the art to modify the reactor taught by the combination of Henley et al., Mahoney et al., Smith et al., and Degner et al. to have an RF bias frequency of about 2 MHz coupled to the workpiece support pedestal. The motivation for including an RF bias generator with a frequency of about 2 MHz coupled to the workpiece support pedestal, as taught by Ishii et al. (Column 5, Lines 57-62), would have been to effectively emit the flow of the plasma onto the target surface of the workpiece.

The RF bias with a frequency of about 2 MHz coupled to the workpiece support pedestal taught by the combination of Henley et al., Mahoney et al., Smith et al., Degner et al., and Ishii et al. would inherently be structurally capable of meeting the limitations of Claims 19-21, depending on the other process settings of the plasma reactor. It has been held that claims directed to apparatus must be distinguished from the prior art in terms of structure rather than function. *In re Danly*, 263 F.2d 844, 847, 120 USPQ 528, 531 (CCPA 1959). Also, a claim containing a "recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus" if the prior art apparatus teaches all the

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structural limitations of the claim. *Ex parte Masham*, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987).

Allowable Subject Matter

10. Claims 26 and 27 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action, to correct the objections set forth above, and to include all of the limitations of the base claim and any intervening claims.

11. The following is a statement of reasons for the indication of allowable subject matter:

The prior art of record, alone or in combination, fails to teach or fairly suggest, in the context of the claims, a plasma immersion ion implantation reactor comprising an enclosure comprising a side wall and a ceiling and defining a chamber; said enclosure **having first and second pairs of openings and first and second hollow conduits outside of said chamber, each conduit having first and second ends connected to respective openings of the corresponding pair of openings, the first and second conduits being oriented transverse to each other, so as to provide first and second reentrant paths extending through each said conduit and across at least nearly the entire diameter of the process region;** and first and second RF plasma source power applicators adjacent said first and second conduits, respectively.

Response to Arguments

12. Applicant's arguments filed 16 January 2007 have been fully considered but, to the extent to which they still apply in view of the new grounds of rejection, they are not persuasive.

Specifically, in response to Applicant's arguments against the references individually (namely Smith et al. and Ishii et al.), one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

In response to applicant's argument that gas distribution openings cannot be incorporated into the ceiling of Mahoney et al., and that Smith et al. teaches a toroidal source remote from a process chamber rather than connected to the process chamber via two openings, the test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981).

In response to Applicant's argument that Ishii et al. has a different reason for changing the height of the workpiece support pedestal than Applicant's desire to constrict the cross-sectional area of the toroidal path, the fact that Applicant has recognized another advantage which would flow naturally from following the suggestion

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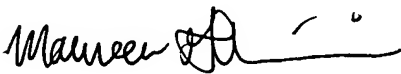
of the prior art cannot be the basis for patentability when the differences would otherwise be obvious. See *Ex parte Obiaya*, 227 USPQ 58, 60 (Bd. Pat. App. & Inter. 1985).

Conclusion

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Maureen G. Arancibia whose telephone number is (571) 272-1219. The examiner can normally be reached on core hours of 10-5, Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on (571) 272-1435. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Maureen G. Arancibia
Patent Examiner
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Parviz Hassanzadeh
Supervisory Patent Examiner
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